

WHAT IS CLAIMED IS:

1(Thrice Amended). A method for nondegenerate four-wave mixing in charge-transfer materials, which comprises the steps of:

5 (a) preparing a mixture of a charge-donor species, wherein the charge-donor species includes semiconducting polymers that absorb light in a first wavelength region with a charge-acceptor species, such that charge transfer occurs between the charge-donor species and the charge-acceptor species in the absence of an externally applied dc electric field when the mixture is excited by the light within the first wavelength region;

10 (b) exciting the mixture with two pulsed light beams within the first wavelength region, the two pulsed light beams overlapping in the mixture and having an angle therebetween, each of the two pulsed light beams having a pulse width less than the time required for charge to be transferred back from the charge-acceptor species to the charge-donor species, whereby a holographic grating is formed in the region of the mixture surrounding the overlapping of the two light beams;

15 (c) passing light within a second wavelength region through the holographic grating region of the blend, wherein the light within the second wavelength region is chosen so as not to be absorbed by the mixture in the absence of charge transfer; and

20 (d) detecting the diffracted light within the second wavelength region.

2. The method for nondegenerate four-wave mixing charge-transfer materials as described in claim 1, wherein light within the second wavelength region is absorbed by species in the mixture which undergo charge transfer.

3. The method for nondegenerate four-wave mixing in charge-transfer materials as described in claim 1, wherein the charge-donor species includes conducting polymers which undergo photoinduced charge transfer to an acceptor species.

4. The method for nondegenerate four-wave mixing in charge-transfer materials as described in claim 1, wherein the charge-acceptor species includes conducting polymers which undergo photoinduced charge transfer from a donor species.

5. The method for nondegenerate four-wave mixing in charge-transfer materials as described in claim 1, wherein the charge-donor species are selected from the group consisting of poly(phenylene-vinylenes), poly(3-alkyl thiophenes), porphyrins, phthalocyanines, polyphenylenes, and semiconductor nanocrystals.

6. The method for nondegenerate four-wave mixing in charge-transfer materials as described in claim 1, wherein the charge-acceptor species are selected from the group consisting of poly(phenylene-vinylenes), poly(3-alkyl thiophenes), porphyrins, phthalocyanines, fullerenes, polyphenylenes, and semiconductor nanocrystals.

7. The method for nondegenerate four-wave mixing in charge-transfer materials as described in claim 1, wherein the charge-donor polymeric molecules are selected from the group consisting of poly[2-methoxy,5-(2'-ethylhexoxy)-1,4-phenylene vinylene] (MEH-PPV), poly(3-hexyl thiophene) and a five-ring oligomer of MEH-PPV.

8. The method for nondegenerate four-wave mixing in charge-transfer materials as described in claim 1, wherein the charge-acceptor molecules are selected from the group consisting of C₆₀ and tetracyano-p-quinodimethane derivatives.